HOME AND NON-HOME BASED CHILDHOOD ACCIDENTAL INJURY IN HOSPITAL UNIVERSITI SAINS MALAYSIA

by

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DISSERTATION SUBMITTED IN PARTIAL FULLFILMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF MEDICINE (PAEDIATRICS)

NOVEMBER 2014

ACKNOWLEDGMENT

Alhamdhulilaahi. All praise to Allah, with whose blessings everything becomes possible. Peace be upon our prophet, Muhammad (SAW) and his followers.

My heartfelt gratitude to my supervisor Dr. Nor Rosidah Ibrahim, for always being there whenever I needed her guidance. My sincere thanks to my co-supervisor Dr.Faisham Taib and field supervisor Dr. Mohd Hashairi Fauzi for their support. Special thanks to AP Dr Ariffin Nasir for helping me with the project throughout. May Allah bless them for their time and effort.

My deepest thanks to all the children and their parents who participated in this study and gave their time and support. It would not have been possible without them.

I am sincerely grateful to my research assistant Emelia for helping me to get all the information needed during the data collection. I also would like to thank the nurses, paramedics and doctors from the A&E department for their help and support.

My thanks also to Hospital Universiti Sains Malaysia, for giving me the opportunity to complete my postgraduate studies in this hospital and to all my lecturers for the help during the last few years.

My sincere gratitude to my parents and my siblings for always inspiring me even in the most difficult of times. Last but not least to the two most special people in my life, my husband and my daughter, thank you for the never ending support and encouragement in each and every step.

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LIST OF SYMBOLS, ABBREVIATIONS OR NORMENCLATURE

NAI	Non Accidental Injury
AHI	Accidental Head Injury
NAHI	Non Accidental Head Injury
A&E	Accident and Emergency
HUSM	Hospital Universiti Sains Malaysia
ICD	International Classification of Diseases
MVA	Motor Vehicle Accidents
RTA	Road Traffic Accidents
LIC	Low Income Country
MIC	Middle Income Country

ABSTRACT

Accidental injury causes significant morbidity and mortality in children but limited data is available in our local set up. The aim of this study was to explore the characteristics of accidental injury in children who sought treatment at the Accident and Emergency (A&E) of Hospital Universiti Sains Malaysia (HUSM) and to determine the associated risk factors for home-based accidental injury in comparison to non-home based accidental injury.

METHOD

A prospective cross-sectional study was done for 5 months duration. A standard data collection form was used to collect the sociodemographic character of injury and possible risk factors related to injury. The accidental injuries were classified according to the 10th revision of International Statistical Classification of Diseases and Related Health Problems (ICD-10).

RESULTS

There were 380 children included in the study from December 2013 till April 2014. All types of accidental injuries except motor vehicle accidents (MVA) occurred more often at home than outside. Falls were the most common accidental injury. The majority of home-based accidents occurred in the youngest age group. Males were more commonly involved with home-based accidental injuries and the ratio of male to female was 1.9:1.

Smaller families and being the first three children in the family have higher percentages of home-based accidental injury. Father's occupation as an executive position and mother being a house wife led to more home-based accidental injuries. Family income being in the range of RM1000-3000/ month

was involved with more home-based accidents.

Father, mother and child's carers having a degree level of education were in majority involved with home-based accidental injuries.

Most of the home accidental injuries had transient disabilities and did not require admission.

CONCLUSION

Majority of the childhood injuries were home-based accidental injuries. Falls were the most common accidental injury although burns, bites and stings were the most common home-based accidental injury. Boys were more involved with accidental injury in both home-based as well as non-home based. Three risk factors the age of the child, that being the younger age groups, all types of accidental injuries except motor vehicle accidents and parents as the carer were found to be significantly associated with home-based accidental injury in comparison to non-home based accidental injury. In the presence of these three factors the risk for home- based accidental injury could be predicted with an accuracy of 87.6%.

ABSTRAK

Kecederaan akibat kemalangan memberi kesan yang serius kepada kanak-kanak namun tidak banyak data mengenainya dilaporkan. Kajian ini dijalankan bertujuan untuk mengenalpasti kes-kes kecederaan akibat kemalangan di kalangan kanak-kanak yang mendapatkan rawatan di Jabatan Kemalangan dan Kecemasan (AE) dari Hospital Universiti Sains Malaysia (HUSM) dan faktor-faktor risiko yang menjurus kepada kecederaan akibat kemalangan di rumah berbanding kecederaan akibat kemalangan di luar rumah.

KAEDAH

Satu kajian prospektif cross sectional telah dijalankan selama 5 bulan. Borang kajian maklumat yang standard digunakan untuk mendapatkan data mengenai kecederaan akibat kemalangan, jenis kemalangan dan faktor risiko yang menjurus kepada kemalangan. Kecederaan akibat kemalangan telah diklasifikasikan mengikut klasifikasi Antarabangsa penyakit versi ke-10 (ICD-10).

KEPUTUSAN

Seramai 380 orang kanak-kanak yang terlibat di dalam kajian ini sepanjang tempoh dari Disember 2013 sehingga April 2014.Semua jenis kecederaan akibat kemalangan kecuali kemalangan kenderaan bermotor (MVA) berlaku lebih kerap di rumah berbanding di luar rumah. Jatuh merupakan jenis kemalangan yang kerap berlaku. Majoriti kemalangan di rumah berlaku dalam kumpulan umur termuda. Kanak- kanak lelaki lebih terdedah kepada kemalangan dirumah dengan nisbah lelaki kepada perempuan adalah 1.9:1.

Lebih kecil bilangan ahli keluarga dan menjadi anak yang tiga terawal di dalam keluarga mempunyai peratusan yang lebih tinggi mendapat kemalangan di rumah. Pekerjaan bapa sebagai eksekutif dan ibu sebagai surirumah lebih menjurus kepada kemalangan di rumah. Pendapatan keluarga dalam lingkungan RM1000-3000 lebih terdedah dengan kemalangan di rumah. Penjaga yang mempunyai pendidikan peringkat Ijazah adalah lebih berisiko dengan kemalangan di rumah. Majoriti kes Kecederaan di rumah tidak teruk dan tidak memerlukan rawatan di dalam wad.

KESIMPULAN

Kebanyakan kemalangan di kalangan kanak-kanak berlaku di rumah. Jatuh merupakan kemalangan yang paling kerap berlaku manakala melecur, gigitan dan sengatan serangga merupakan kemalangan yang sering berlaku di rumah. Kanak-kanak lelaki lebih berisiko untuk mendapat kemalangan di dalam dan di luar rumah. Tiga faktor iaitu umur kanak-kanak yang lebih muda, jenis kemalangan kecuali kemalangan kenderaan bermotor dan ibubapa sebagai penjaga telah dikenalpasti berkaitan dengan peningkatan risiko kemalangan di rumah berbanding dengan di luar rumah. Kewujudan 3 faktor-faktor ini mampu meramalkan kebarangkalian kemalangan dengan peratusan ketepatan setinggi 87.6%.

1. INTRODUCTION AND LITERATURE REVIEW

OVERVIEW OF INJURIES IN CHILDREN

Injuries in children can be subdivided into intentional injuries or non-accidental injuries (NAI) and unintentional injuries which are also referred to as accidental injuries. Injuries and violence kills around 950,000 children and young people all over the world every year. More than 90% of these injuries are due to accidental injuries which are preventable (World Health Organization, 2008).

Although there may be difficulty in establishing the underlying cause or nature of the injury, there are some features in the presentation as well as the examination findings which could prove useful. A measureable number of studies have been done in the field of features of injuries to aid in the differentiation of NAI from accidental injuries. A study done by Ortega et al., (2013) showed that most of the children who died of NAI were seen in the hospital two months earlier with another injury and mostly involved younger age groups. Most of the fatalities were associated with non-accidental injuries. Eighty percent of NAI were associated with subdural hematomas compared to only 7% attributed to accidental injuries. Sub retinal haemorrhages were also persistently associated with an NAI (Ortega et al., 2013)

Thalayasingam et al.,(2012) did a study in Malaysia on clues for accidental or non-accidental injuries in infants presenting with head injuries. This study showed that non- accidental head injury (NAHI) was more common in males and also occurred in the younger age groups. More than 50% of NAHI had no history to explain the injury, and a delay was noted in seeking medical assistance in 44 % of NAHI and 10 % of the accidental head injury (AHI).

Injuries in children with any features to suggest NAI need to be properly studied to exclude intentional injury to children. As the approach in terms of management and the associated problems is completely different in accidental and non-accidental injury, it is of paramount importance to arrive at a conclusion as to the nature of injuries in children as early as possible.

ACCIDENTAL INJURIES IN CHILDREN

Accidental injuries or unintentional injuries in children include a wide variety of different types of injuries. An injury to a child, whether from a motor vehicle accident or a fall while riding a bicycle, is included in the accidental injury in children, if the event is secondary to accident and is unintentional.

According to the International Statistical Classification of Diseases-10th revision (ICD-10) there are more than 10 different categories of these accidental injuries. ICD-10 is a system used for coding of diseases, signs, symptoms , abnormal findings, complaints, social circumstances and external causes of injury or disease as classified by the World Health Organisation (WHO). Each of these categories can be further subdivided into different sub types of injuries. These include but are not limited to vehicle and traffic accidents, falls, and hit /struck by/ against objects, equipment, machinery, materials, pressure, noise or force, hit/struck/bitten by person or animal, drowning/suffocation, exposure to electrical current or radiation, fire/flames or hot objects, nature environmental venomous exposures, poisonings and over exertions.

The Convention on the Rights of the Child endorsed by almost all government states around the globe states that “children around the world have a right to

safe environment and protection from injury and violence” (United Nations, 1989).

It also mandates that the institutions, services and facilities responsible for care of children, should make sure that these requirements are met and the children’s surrounding environments are safe and they are protected from the hazardous situations around them as they go about in their daily activities. (United Nations, 1989).

GLOBAL BURDEN

The impact and consequence of these accidental injuries could be devastating with loss of life or could be life-long with disabilities. Road Traffic Accidents (RTA) is the leading cause of death among children ages 15-19 and the second leading cause of death among children ages 5-14. Apart from this, tens of thousands of children all over the world seek medical attention for non-fatal accidental injuries every year (Peden et al., 2008).

In the Global causes of death in the less than 5 years children, 5% were shown to be due to injuries in an updated systematic analysis for 2010 (Liu et al., 2010).

Apart from the contribution to mortality, the importance of accidental injury lies in the morbidity associated with it. Morbidity ranges from transient disabilities to permanent disabilities with psychological impact for the family and child.

The injured children and the family members can develop post-traumatic stress including impulsiveness, depression and despair for months after the incident (Holland et al., 2000).

In a child who is still growing and developing the injuries may also affect the social, mental, behavioural development and educational aspects.

Accidental injury is also associated with a significant financial burden to the governments and community due to the high cost of treating and rehabilitating these children, surpassing the cost of preventative programmes. A study done on the economic cost of childhood unintentional injuries showed that, the cost of childhood unintentional injury is enormous, ranging from US$ 516,938 to US$ 9,550,704 per year with the majority of the burden falling on the low and middle income countries compared to high income countries (Lao et al., 2012). As most of these injuries are preventable the impact of these unfortunate incidents could be decreased by education, monitoring and minimising the risks which these children are exposed to.

The consequences of these accidental injuries could involve fractures requiring multiple hospital admissions for surgeries and rehabilitations, intracranial haemorrhage with associated neurological complications leading to dependency on family members, major burns with disfigurements, organ failures requiring organ transplants, and even death. Additionally, prolonged hospital stay and the consequent disabilities lead to long leaves from work for parents and from school for the children involved.

Brook & Boaz (2003) reported that severity of accidental injuries in Israel were found to be light (children discharged without handicaps) in 13.2%, moderate

(children had undergone surgical intervention with prolonged or permanent disability) in 74% and severe (children were treated in intensive care units and had permanent irreversible handicaps) in12.9% of the children studied.

ACCIDENTAL INJURIES IN THE DEVELOPED WORLD VERSUS DEVELOPING WORLD

Accidental injuries in children are one of the most serious public health problems in the developed as well as developing countries. (WHO, 2008)

It is important to note that the burden of injuries to children is unequal, those from poorer countries and poorer families are most vulnerable with more than 95% of the deaths occurring in the low and middle income countries (WHO, 2008).

In developed countries like the United States of America, accidental injury is the number one preventable cause of death in children (Svien et al. 2010). It has been highlighted as an under recognized public health problem. The state of South Dakota has been highlighted as a state of high childhood injury deaths with the majority of deaths occurring in the male children and associated with transportation-related injuries (Svien et al., 2010).

A nationwide study of non-fatal accidental injuries in the United States has shown that as many as 12 million injuries occurred per year. Falls is number one cause of injury among all the age groups followed by cut injuries (Runyan et al., 2005). Injures were also found to be highest in the youngest and the oldest age groups (Runyan et al., 2005).

In Scotland a study done by Pearson & Stone (2009) showed injuries as the leading cause of death in the age groups 1-14 years old. The different causes of death varied according to age group but road traffic accidents were the number one cause of death.

In developing countries accidental injuries are more or less a back-seated issue and need to be brought to the front line. The available data is scarce and much needs to be done in terms of research. The actual incidence of morbidity, mortality and associated risk factors need to be studied. The preventative legislations and what needs to be done in the future in prevention of these accidental injuries need to be properly ascertained.

In China injuries were shown to be the most common cause of death in the age group 1-14 years (Yang et al., 1997).

A study by Sun et al., (2006) on accidental injuries at school involving 10,000 primary and middle school students in ten schools in China showed an annual person-based school injury rate of 5.22% (95 % CI: 3.90-6.53). The most common injuries were falls (73%). Male sex and primary school grade were the associated risk factors for increased chance for accidental injuries.

A multi-centre hospital based study in Tehran, Iran by Karbakhsh et al., (2008) showed that 15.1% of all hospitalised trauma patients were children where 98.6% were injured accidentally. Most of the children had mild injuries (80.2%) and only 2.26% of them had mortality.

Sixty nine percent of the affected children were male. More than half of the accidental injuries were due to falls followed by road traffic accidents. The most common place of occurrence was streets (45%) followed by home (38%)

(Karbakhsh et al., 2008). This study has lead to several injury prevention strategies to be formulated and implemented in Iran, highlighting the importance of such local studies to aid in the prevention of these largely avoidable injuries.

Accidents in children are more common for several reasons. These include the developmental stages and the environment in which they live in. These children may be unstable in terms of mobility for example at around one year when they first start walking. They also have an experimental nature with a rapidly increasing curiosity (Gilbride et al., 2006). Additionally during the adolescent years children may be predisposed to injury due to an increased risk taking behaviour.

At the same time the environment they live in may not be a safe place, be it at home with open excess to the kitchen or without the seatbelt at the back of a car or at the school playgrounds without proper safety measures.

ACCIDENTAL INJURIES IN MALAYSIA

There is limited data published in Malaysia on the accidental injuries in children. A report by the, Ministry of Health, Malaysia states that more than half of the accidental injuries in children admitted to government hospitals in Malaysia are due to MVA, while fall are the second most common. All the other types of injuries are more commonly associated with children than with adults (Ministry of health, Malaysia, 2007).

There have been some legal frame works put in place to bring down these accidental injuries in children in Malaysia. However, much needs to be done in

terms of research to know the types and nature of injuries and specific risk factors associated with accidental injuries in Malaysia. It is also very important to know where the majority of these accidents are occurring so that steps could be taken to ensure that these accidents are minimised as much as possible.

HOME-BASED AND NON-HOME BASED ACCIDENTAL INJURIES

Although home should be the safest place for a child, it has been noted that majority of the fatal accidental injuries occur at home (Karbakhsh et al., 2008). This further highlights the importance of implementing preventative strategies at places where children spend a significant amount of their time.

Although home is where children spend majority of their time, limited studies could be found that compare accidents that occur at home, with accidents that occur at other places. Studies mostly give importance to the types of accidents rather than the place of occurrence.

A study from Iran, (Karbakhsh et al., 2008) reported that home is the second most common place of accidental injuries with 38% of injuries occurring at home. Guisán et al., (2007) also reported that majority of the injury occurred at home followed by the highway in a Spanish population. Farchi et al., (2006) reported accidental injuries in the home as a relevant public health problem in Italy. From this study it showed that home injury incidence rate was high for children at 5757/100,000 in the less than 5 year age group.

A study from Israel by Brook & Boaz (2003) reported the frequency of accidents at home (52.3%), road (19.3%), school (11.6%) and sports (17.4%)

FACTORS AFFECTING ACCIDENTAL INJURIES

Some factors have been identified to be associated with higher risk for accidental injuries in children. Knowing the risk factors help in identifying where to put the focus in terms of accident prevention such as health education, home assessment and environmental modification programmes as well as legislative measures.

A study done by Sun et al., (2006) showed that the risk of school injuries was significantly associated with male sex, primary school graders, administrative professions and large extended families. Higher educational standard of mothers was found to be a protective factor.

Another study done by Wang et al., (2011) showed that fathers being self-employed, child's temperament type, inappropriate storage of medications and inappropriate placement of heating equipment were associate with an increased risk of child injury. Educating the child on injury prevention by the teacher as well as parents decreased the risk for injury. (Wang et al., 2011)

Kendrick & Marsh (2001) from United Kingdom (UK) reported that residence in a low socioeconomic area, young maternal age, male sex, belonging to an ethnic minority and non-ownership of a car were independently associated with a high incidence of accidental injury.

The Young Lives study done to assess the risk factors associated with accidental injury by Howe et al., (2006) showed the occurrence of care giver depression as a consistent risk factor for all the types of injuries in four developing countries. Other risk factors included long term child health problems, region of residence and the regular care of the child by a non-house hold member. This study was one of the few contributors to the risk factors for accidental injury in developing countries.

Another study by Schnitzer et al., (2013) showed that children were more likely to be beyond reach of their caregiver at the time of injury and children with lower supervision had the greatest odds of injury.

PREVENTION OF ACCIDENTS

Accidental injuries are largely preventable. Research has focused on the effectiveness of preventative strategies on minimizing the burden of these accidents.

In spite of this the evidence base for prevention programmes in the area of unintentional injury is limited by a lack of rigorous research, inclusion of low risk participants and interventions that do not include behavioural skills training. Interventions that have been shown to prevent deaths among young children include car seat use, safe infant sleep, home hazard reduction and care giver supervision (Damashek et al., 2014).

Nauta et al., (2013) did a systematic review on the use of safety devices, pedestrian safety and physical activity-related injury prevention. There were a

total of 8 studies included in the review which were from the USA, Britain, Australia and Netherlands. The studies aimed to assess the improvement in the knowledge of accident prevention after interventions including classroom lessons, media messages, distribution of posters and individual counselling sessions.

Five of the studies reported improvement in safety device (e.g. safety helmet) use when children are given a helmet and shown how to wear it themselves in 8-12 years age group. The improvement lasted for a short period but there was no persistent improvement in the long term. It was also found that interventions such as increased physical activity levels in the less active children were effective in reducing injury.

OPERATIONAL DEFINITIONS

An accidental injury is defined as an unexpected, unintentional and violent event, affecting a child, with or without detectable lesions and subsequently leading to medical attention.

Home-based injury is defined as an injury which has occurred inside the home of the patient as well as the areas that are adjoining the home including the garden, yard and drive ways.

Non-home based injuries are defined as the injuries occurring in areas apart from the above mentioned areas.

RATIONALE AND SIGNIFICANCE OF STUDY

Accidental Injuries are a preventable cause of health care cost associated with significant morbidity and psychological effect to children and families. This research can hopefully highlight the importance of the need for a state wide or nationwide study in to the matter. This is needed to understand the prevalence of accidental injuries and the risk and the cost associated with them. These would help in formulating steps which are needed to prevent these injuries in children.

At present not much research has been done to find out the impact of accidental injury in children in Malaysia. A lot of data is from the neighbouring countries. It is essential to come up with nationwide studies concentrating on this topic as the possibility that accidental injury contributing to the mortality and morbidity of children in a large scale is very plausible.

It is important to know the magnitude, risk factors and consequence to setup timely and adequate preventive action and for the education of families and other groups involved with child care.

Most of the previous studies did not try to find out any differences in the injuries occurring at home and outside. As children spend a lot of time in their homes it is imperative that their homes be a safe place for them. Thus knowing the risk factors related with home injuries is essential.

It is hoped that this study can shed some light on the important areas in minimising accidental injuries in children and contribute towards effective preventive measures to further reduce the risk of accidental injuries in children.

OBJECTIVES

GENERAL OBJECTIVE

1. To describe the home-based and non-home based accidental injuries in Hospital Universiti Sains Malaysia from December 2013 to April 2014.

SPECIFIC OBJECTIVES

1. To determine the proportion of home-based and non-home based accidental injuries in HUSM from December 2013 to April 2014.
2. To determine the associated factors which are related to home-based accidental injuries in comparison to non-home based injuries

RESEARCH HYPOTHESIS

1. There will be significant proportion with home-based and non-home based injuries coming to HUSM with a variety of different types of accidental injuries and home injuries making up the majority.
2. Certain risk factors will be identified to be associated with home-based injuries.

3. METHODOLOGY

RESEARCH DESIGN

Place of study

This was a prospective cross sectional study which was conducted in the Accident and Emergency (A&E) Department of the Hospital Universiti Sains Malaysia (HUSM) from December 2013 to April 2014. This department functions as the referral unit for a large area of the city of Kota Bharu as well as some of the surrounding cities and states.

Population and sample

Children who came to A&E of Hospital USM.

Reference population

Children between the ages of 0-12 years who are at risk for accidental injury.

Source population

Children between the ages of 0-12 years who came to the Accident and Emergency department of HUSM from December 2013 to April 2014 with an accidental injury.

INCLUSION CRITERIA

1. Any child with an accidental injury coming to the A&E Hospital USM between the age group 0 - 12 years.

EXCLUSION CRITERIA

1. Any injury for which the nature of injury is debatable, i.e. non-accidental injury.

2. Children with underlying disorders which predispose to injury, example, epilepsy.

SAMPLING METHOD

Convenient sampling was used in recruiting the children with accidental injuries.

All children who fulfil the inclusion criteria were recruited, after obtaining parental consent.

SAMPLE SIZE CALCULATIOIN

Sample size was calculated differently for individual objective. The biggest sample size was used for the study.

The sample size was based on a study done by Thein et al., (2005) on the prevalence of accidental injury in children where fourty five percent was home-based injuries.

Objective 1: To determine the proportion of children with home-based and non-home based accidental injuries in HUSM from December 2013 to April 2014.

A single proportion formula was used with 5% precision and estimated prevalence of 45.0% (Thein et al., 2005)

Method – single proportion

P=0.45

Power= 0.8

Alpha=0.05

p=0.45

n = sample size

$n = (z/\Delta)^2 p (1-p)$

$n = (1.96/0.05)^2 x0.45 (1-0.45)$

n = 380

Sample size = 380

Objective 2: To determine the associated risk factors which are related to home-based accidental injuries in comparison to non-home based injuries.

Table 1 Sample size calculation for objective 2

Risk factor	Po	Pi	Calculated sample size
Gender-male (Villalba-Cota et al., 2004)	0.55	0.70	162
No of siblings >5 (Villalba-Cota et al., 2004)	0.08	0.28	57
Maternal education <6 year (Villalba-Cota et al., 2004)	0.72	0.50	76

To answer both objectives a sample size of 380 was taken.

DATA COLLECTION

Data was collected using a standardized case recording form (attached in the appendix) for injury details and demographic details. Following convenient sampling, patients were recruited from the Accident and Emergency department, Hospital USM after obtaining parental consent. It was done over a time period of 5 months from December 2013 to April 2014.

Once a patient had registered in Accident and Emergency department the patient was triaged depending on the severity of the accidental injury in to either red, green or yellow zones.

The patient was then evaluated to see whether they fit the inclusion criteria following which, parents/guardians were then approached.

The patient's guardian was then informed regarding the study and the consent. Once the parental consent was given the data collection form was filled by the researcher and/or research assistant.

If the patient requires admission, then the patient was followed up in the ward before discharge and the patient folders were accessed, and the injury details, interventions required as well as severity details regarding the accident were gathered as in the data collection form.

The patient number was used as a unique number to identify each patient detail and a research number were assigned to each patient to ensure privacy. The privacy of patient was assured at all times during the course of the study.

The data were then entered and analysed using the SPSS version 20.0.

STEPS TAKEN TO ENSURE MINIMAL ERRORS

1. All the data was collected using the data collection form. The information was collected from the parents of the child involved.

2. The ICD-10 classification system was used as a means of classifying the types of injury.

DATA ENTRY

All the data entry and analysis was done using the SPSS version 20.0

INDEPENDENT VARIABLES

Home-based accidental injuries

All the injuries occurring at home as defined in the operational definitions were taken as home injuries.

Non-Home based accidental injuries

All the injuries occurring at a place other than as being defined by home is taken as non-home based injuries.

DEPENDENT VARIABLES

Age of the child

Age of the child was taken as the nearest year completed in children more than one year and in months as a proportion of years in children less than one year.

Age of the child was taken as the age recorded in the hospital record when the child registered in A&E and then this was confirmed back with the parents.

During the data entry the age groups were regrouped into four different categories as 0-1 year, 2-4 years, 5-6 years and 7-12 years. The 0-1 year age group was decided as it reflects infants. Two to four years as toddlers are quite active at this stage. 5-6 years age group includes the children in preschools and the 7-12 years reflects the children in the primary school. The age group 7-12 year was taken as the reference population as it was thought that this is the

group with the least risk for accidental injury due to the highest level of development compared with all the age groups.

There was one missing data in this group.

Gender

Gender was taken as either male or female according to the registration at admission and from the parent's information. Female gender was taken as the reference population as majority of the studies had shown that male gender is associated with higher risk for accidental injuries. This group also had one missing data.

Order of child in family

Order in family is the order of birth for the child in the family. For example if the child is the 1^{st} in order of family of two it means that the particular child is the first born child of the family.

This was further regrouped to 1^{st} to 3^{rd} child, 4^{th} to 5^{th} child and 6^{th} to16^{th} child.

The aim of regrouping was to see whether being the first, middle or last child has a higher possibility of accidental injury. The reference population in this group was 6^{th} to 16^{th} child group, meaning the group who were the elder of all the siblings. This group had four missing data.

Number of children in the family

This was studied to see the effect of family size on the injury pattern. This group was further regrouped into 1-3 children, 4-6 children and 7-16 children. The reference group was taken as the middle group as we expect more injuries to

occur with the extremes of number of siblings. This group also had four missing data.

Address of the child

The parents were asked to give the city where the family is currently residing.

The address was further regrouped to the cities with the maximum number of children and the uncommon ones were regrouped as others. Some of the cities were from far away states. These cities had one or two patients only as the accidental injury in some children happened while they were visiting relatives or traveling through the areas near to the hospital of study. The others group was then used as the reference group.

Family income

Family income was taken as the total income to the family per month. If both parents were working this was taken as the sum of the income of both parents. This group has been regrouped in to 4 groups. This includes the group with RM less than 1000, RM 1000-3000, RM 3000-5000, RM >50000. The reference group is the group with the lowest income as it was thought that poor socioeconomic status would be associated with risk for accidental injury.

Types of injury

The type of injury was classified according to the ICD-10 classification of the causes of accidental injury at the point of contact with the child in the A&E.

This classification was according to the mechanism of injury. There were around 22 different types of injury. This lead to the regrouping of accidental injury to the most common types. This included falls, motor vehicle accidents

(MVA), burns, bites and stings and others. In the others group were included all the other types of injury apart from the major ones according to the ICD-10. The reference group was set as MVA.

Living with

This variable was used to evaluate the effect of the person the child lives with on the risk of accidental injury. This group was further regrouped in to parents, grandparents and baby sitter. The parents were labelled the reference group.

Relation to the caregiver at the time of injury

This variable was used to assess the risk for injury and relation to the care giver during time of injury. This was regrouped as parents (mother/father), other relative and non-relative. The reference group was the parents.

Caretaker presence during injury

This was used to see whether the caretaker presence will affect the risk for injury. This group had either a yes or no as the option. The reference group was the group without the care taker present at time of injury.

Father's occupation

This was taken as the occupation of the father at the point of contact in the A&E. A variety of different occupations lead to the regrouping of the father's occupation in to manager, self-employed, machinery operators, security personnel , professionals and others.

In the group of managers were included any occupation where there were administrative or executive capacities

The self-employed group were labelled as the parents who themselves label the occupation as self-employed meaning they work on their own.

Machinery operators include carpenters, construction workers, mechanics, welders and automobile operators.

Security personnel consist of the persons whose job description involves maintaining order and security. Include in this group are security guards, policeman and army.

Professionals included the associate professionals and consisted of teachers, nurses, lecturers, pilots, dentists, chefs, engineers' doctors, lawyers, principals and accountants.

There were 4 missing data and the fathers who had already passed away were also classified as missing data. The reference is the group labelled others.

Mothers' occupation

This was taken as the occupation of the mother at the point of contact in the A&E. A variety of different occupations lead to the regrouping of the mother's occupation into housewives, professionals, self-employed and others. There were 8 missing data. House-wives were the mothers without any responsibility to provide an income with the sole purpose of taking care of home and children. The self-employed mothers were the mothers who were working at home or outside but was the head of the job that was being done. Professionals included nurses, teachers, engineers, lecturers, dentists, accountants and doctors.